Government of Western Australia
Department of Water and Environmental Regulation

Amendment Report

Application for Licence Amendment

Part V Division 3 of the *Environmental Protection Act 1986*

Licence Number	L8684/2012/2
Licence Holder	Shire of Cocos (Keeling) Islands
File Number	2012/006264-1
Premises	Home Island Transfer Station Jalan Balok Mem Home Island Cocos (Keeling) Islands Indian Ocean Territories WA 6799 Legal description – Part of Lot 1106 on Deposited Plan 30520 As defined by the Premises map attached to the Revised Licence
Date of Report	03 April 2024
Decision	Revised licence granted

Melissa Chamberlain

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an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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1. Decision summary

Licence L8684/2012/2 is held by the Shire of Cocos (Keeling) Islands (Licence Holder) for the Home Island Transfer Station (the Premises), located at Part of Lot 1106 on Plan 30520, Home Island, Cocos (Keeling) Islands.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the operation of the Premises. As a result of this assessment, Revised Licence L8684/2012/2 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

2.2 Application summary

On 18 December 2023, the Licence Holder submitted an application to the department to amend Licence L8684/2012/2 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The proposed amendment relates to the extension of the prescribed premises boundary, due to the limited area currently available for waste burial.

This amendment is limited only to changes to Category 64 and 57 activities from the Existing Licence. No changes to the aspects of the existing Licence relating to Categories 59 and 60 have been requested by the Licence Holder.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed in Table 1 below.

Table1 also details the proposed control measures the Licence Holder has proposed to assist in controlling these emissions, where necessary.

Table 1: Licence Holder controls

Emission	Sources	Potential pathways	Proposed controls
Leachate	Burial of biosolid waste and putrescible waste	Subsurface seepage	Existing Licence L8684/2012/2 controls.
		Lateral (horizontal) flow of groundwater to the marine environment.	

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020), the Delegated Officer has excluded employees, visitors and contractors of the Licence Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 2 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guideline: Environmental siting* (DWER 2020)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity
Main Residential settlement	Approximately 800 m to the south east
Residence	Approximately 500 m to the south east
Environmental receptors	**Distance from prescribed activity**
Proposed Home Island Northern Freshwater Lens Water Reserve boundary	Approximately 30 m to the west
Marine environment	Approximately 20 m to the east
Underlying groundwater	Approximately 2 mbgl

Figure 1: Location relative to the Home Island settlement

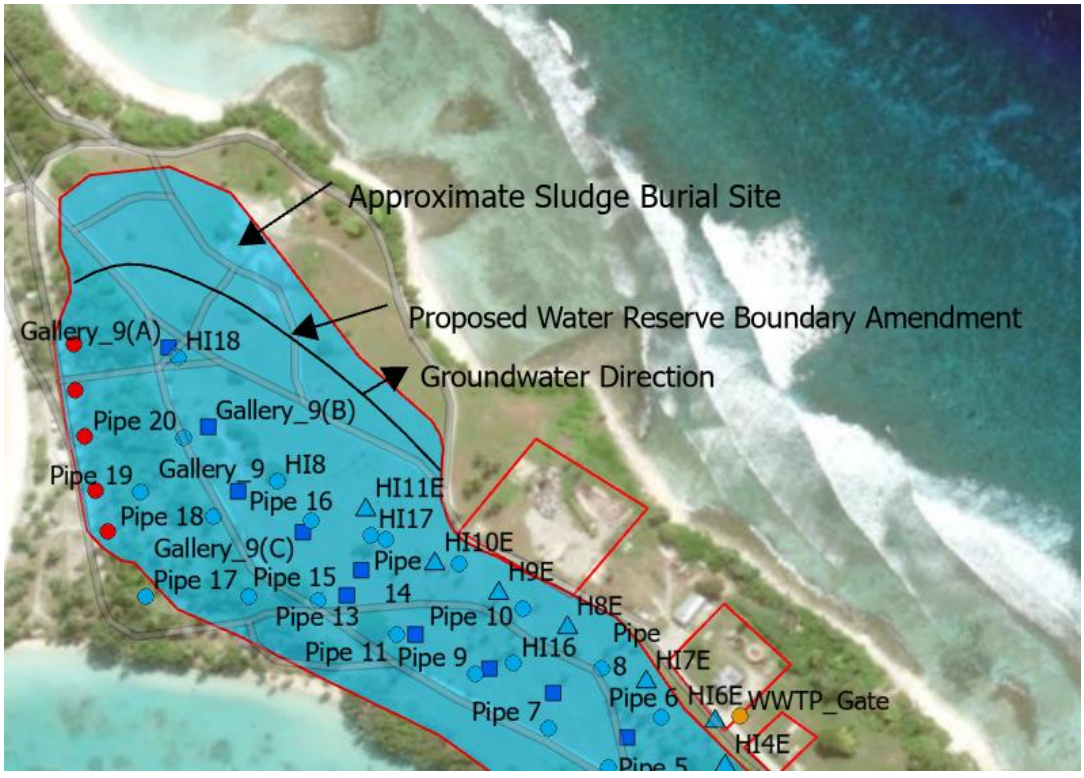

Figure 2: Location relative to the Home Island Freshwater lens boundary

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the Licence Holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Licence Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the licence as regulatory controls.

Additional regulatory controls may be imposed where the Licence Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

The Revised Licence L8684/2012/2 that accompanies this Amendment Report authorises emissions associated with the operation of the Premises.

The conditions in the Revised Licence have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

Table 3. Risk assessment of potential emissions and discharges from the Premises during operation

Risk Event					Risk rating[1] C = consequence L = likelihood	Licence Holder's controls sufficient?	Conditions[2] of licence	Justification for additional regulatory controls
Source/Activities	**Potential emission**	**Potential pathways and impact**	**Receptors**	**Licence Holder's controls**				
Operation								
Burial of biosolid waste and putrescible waste	Leachate	Subsurface seepage causing contamination of soil and groundwater.	Proposed Home Island Northern Freshwater Lens Water Reserve boundary 30 m west	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Existing conditions 1.3.1 and 3.4.1 **Condition 4.1.1, IR1 and IR2**	Refer to Section 3.3
		Lateral (horizontal) flow of impacted groundwater to the marine environment.	Marine environment 20 m east	Refer to Section 3.1	C = Moderate L = Unlikely **Medium Risk**	Y	Existing condition 1.3.1	Refer to Section 3.3

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020).

Note 2: Proposed Licence Holder's controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

3.3 Detailed risk assessment for groundwater contamination

As described in *Geology and hydrogeology of the Cocos (Keeling) Islands, Indian Ocean* (Woodroffe, C. D., and Falkland, A. C., 1997), the Cocos Islands atoll consists of coral sediments, several hundreds of metres thick, overlaying volcanic seamounts. They are connected by a submarine ridge about 1,000 m deep and form a part of the Cocos Rise within a chain of discontinuous seamounts, called the Vening Meinesz seamounts, which continues towards Christmas Island.

In atoll islands, including those within the Cocos (Keeling) Islands, two geological layers are generally found in the upper 20 m. These layers are an upper, younger (Holocene) layer consisting of unconsolidated coral sediments (sands and shingle) and a lower, older (Pleistocene) layer of karstic coral limestone (Figure 3).

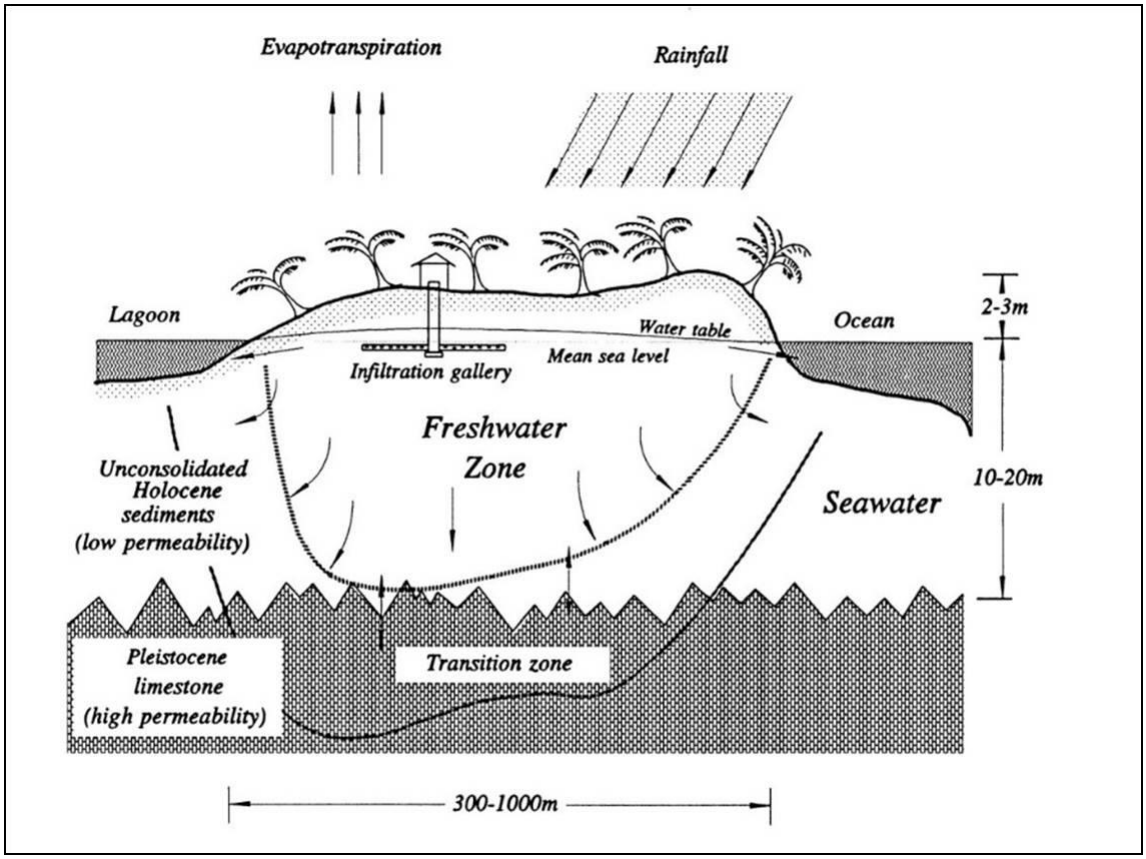

Figure 3: Cross section through a typical freshwater lens showing unconformity between unconsolidated Holocene sediments and Pleistocene limestone [*Home Island Water Supply Options* (Falkland, 1994)]

The unconformity between the two layers was formed by solution and erosion during a period of emergence in the Last Interglacial period. The upper sediments were deposited in the last 10,000 years. From drill logs, the unconformity is typically found at depths from 10 m to 17 m in the Home and West Island freshwater lenses.

Owing to the highly permeable sands on the islands, there are no fresh surface water resources. The freshwater lenses on Home Island are highly vulnerable to contamination from both seawater intrusion and pollution sources due the shallow depth to groundwater, sandy porous soils and limited thickness of the lenses.

The department initiated the potential proclamation of the Indian Ocean Territories water sources, including all current and future public drinking water sources, through a May 2023 Communications Strategy to Department of Infrastructure, Transport, Regional Development, Communications and the Arts. Proclamation of the Indian Ocean Territories (IOT) public drinking water sources will occur under the *Country Areas Water Supply Act 1947(WA)(CI)(CKI*). If approved, this will allow the Commonwealth to provide a regulatory framework to protect, allocate, licence and regulate groundwater abstraction and water source protection.

The Water Source Protection branch of the department provided advice, dated 1 November 2023, regarding the contamination risk of the sludge burial site to the Home Island Freshwater lens and its proposed boundary.

The advice was based on a review of hydrological literature, namely the *Report on May 1998 Drilling Program* by Tony Falkland and a site visit conducted 11 October 2023.

The review identified that:

- Freshwater over much of the Home Island Northern Lens is much more likely to move downwards and mix into the transition zone than it is to move horizontally and discharge at the edge of the island.
- In practice for the Home Island Northern Lens, it is likely that the average horizontal velocity within the lens only exceeds the vertical velocity at distances quite close to the beach. This means that it is much more likely that the fresh groundwater will exist through the transition zone rather than at the edge of the island. While it is difficult to estimate the distance exactly, it is likely that outflow to the beach occurs only from within the nearest 50 m from the beach. In the rest of the freshwater lens, the fresh groundwater exits by mixing with underlying seawater water within the transition zone.
- Groundwater (and any associated pollutants) near the facilities on the ocean side of the island (including the transfer station premises and associated waste burial activities) would either discharge near the ocean beach or mix with the transition zone under the island on the ocean side.

Key Findings:

1. The review found that the burial site pit has a low probability of contamination risk to the proposed Home Island Northern Freshwater Lens and that there is no receptor pathway based on the hydrological setting of the Home Island Northern Freshwater Lens and the locations of the sludge burial site in review of the hydrological setting.
2. The assessment concluded that the Northern Freshwater Lens and the proposed water reserve will not be impacted by the proposed extension of the premises boundary and disposal areas.
3. As a precautionary measure, it is recommended that a pollution surveillance bore is installed between the site and the Home Island Northern Freshwater Lens proposed water reserve boundary.

3.4 Detailed risk assessment for marine contamination

While it has been determined that the Northern Freshwater Lens and the proposed water reserve will not be impacted by the proposed extension of the premises boundary and disposal areas, a risk to the marine environment through lateral groundwater movement may remain.

The Home Island Wastewater Treatment Plant (WWTP) is located adjacent to the east of the Transfer Station premises. Wastewater is treated to secondary standard before being disinfected by UV radiation and discharged to the Indian Ocean via an outfall pipeline approximately 300 m off shore and at a depth of 15m. Due to this marine discharge, shoreline monitoring and outfall marine water quality monitoring is undertaken by the WWTP licence holder. The monitoring locations are depicted in Figure 4.

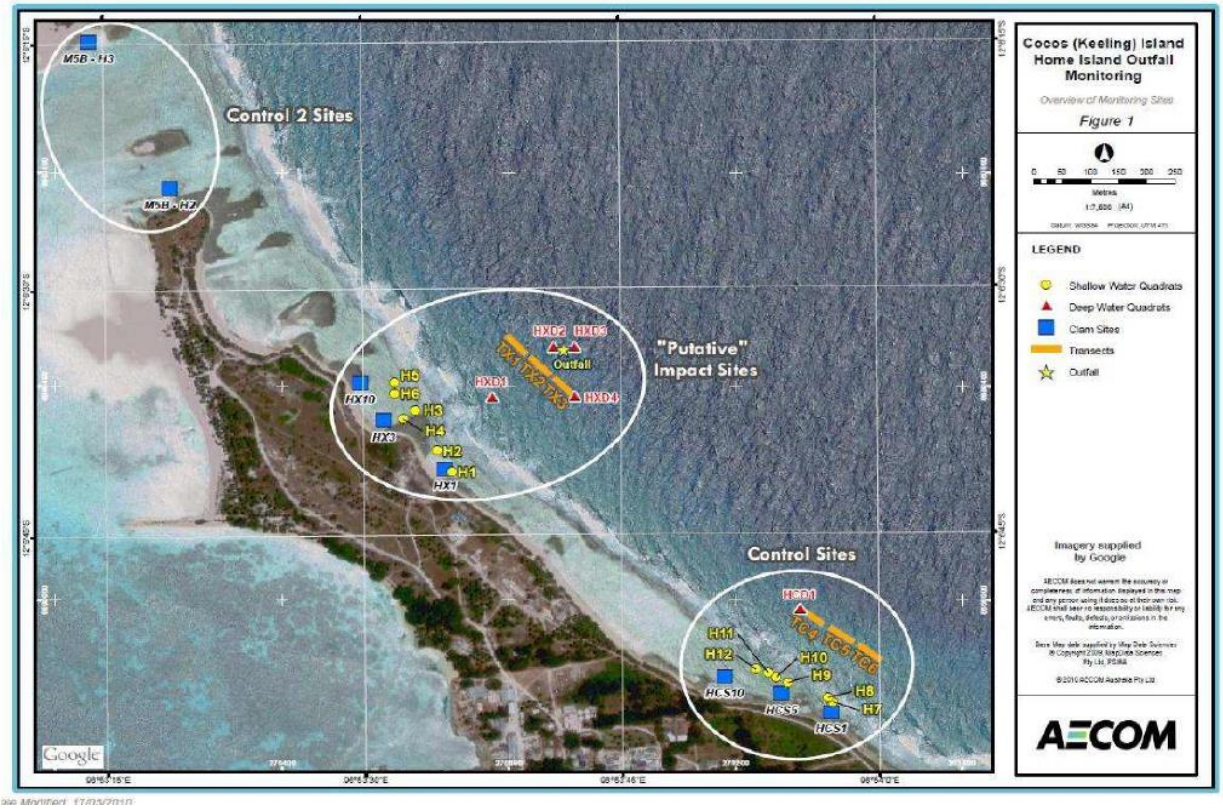

Figure 4: Shoreline monitoring locations (supplied from Licence L8335/2009/5)

Due to the locations of the shoreline monitoring, the nutrient data (Ammonium as Nitrogen, Nitrite plus Nitrate, Total Nitrogen and Total Phosphorous) can be interpreted for also assessing marine impacts due to the burial of waste and sludge material at the Transfer Station.

Historical data collected for the shallow locations from 2017 to 2023 has shown no adverse changes to the marine environment from the activities being carried out from the eastern shoreline.

Home Island Ocean Outfall Cocos (Keeling) Islands Biennial Monitoring 2020 (TLA Environmental, April 2020) stated that there was no evidence of impacts associated with the outfall at either Deep or Shallow sites during the 2020 monitoring survey (noting that the requirement for Marine Benthos and Surveys of deep points are required every five years).

Key Findings:

4. Due to the historical data collected for the shallow locations demonstrating no adverse changes to the marine environment from the activities being carried out from the eastern shoreline, the department considers that the current controls to mitigate impacts to the marine environment from the premises to be adequate.
5. Continued sampling and analysis from shallow locations will be used assess any potential trends from future activities at the premises.

4. Consultation

Table 4 provides a summary of the consultation undertaken by the department.

Table 4: Consultation

Consultation method	Comments received	Department response
Licence Holder was provided with draft amendment on 26 March 2024	The licence holder has concerns that the design, construction and installation of a groundwater monitoring well in accordance with condition 4.1.1 by 30 September 2024 is not achievable. Specialist machinery to island could require a six month lead time between design and onsite works due to the frequency of shipping. A date of completion of 30 April 2025 is requested.	The Delegated Officer considers an amended groundwater monitoring well completion date of 30 April 2025 to be appropriate due to the factors identified by the licence holder.

5. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a Revised Licence will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

5.1 Summary of amendments

Table 5 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Licence as part of the amendment process.

Table 5: Summary of licence amendments

Condition no.	Proposed amendments
3.4.1	Inclusion of the groundwater well constructed in accordance with IR1 in the monitoring table.
4.1.1, Existing IR1	Removal of the Improvement program due to the completion of the separation distance requirements.
4.1.1, New IR1	Requirement to install a groundwater monitoring well located between the northern extended premises boundary and the Home Island Northern Freshwater Lens proposed

	water reserve boundary.
4.1.1, New IR2	Requirement to submit a well construction report following installation of the groundwater monitoring well.
Premises map	Updated to include the requested northern extension.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
3. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
4. DWER 2019, *Guideline: Decision Making*, Perth, Western Australia
5. DWER 2019, *Guideline: Industry Regulation Guide to Licensing*, Perth, Western Australia